

No. 7284

IN THE
United States Circuit Court of Appeals
For the Ninth Circuit

THE MAGNAVOX COMPANY (a corporation),
Appellant,
vs.

ERNEST INGOLD, INC. (a corporation),
Appellee.

THE MAGNAVOX COMPANY (a corporation),
Appellant,
vs.

STROMBERG-CARLSON TELEPHONE MANUFACTUR-
ING COMPANY (a corporation), and GARNETT
YOUNG & Co. (a corporation),
Appellee.

BRIEF ON BEHALF OF APPELLANT.

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BRIEF ON BEHALF OF APPELLANT.

STATEMENT OF THE CASE.

Involved herein are two different patent infringement suits. The patents sued upon are the same in both cases, and the structures alleged to infringe are alike. The two suits were consolidated and tried as one in the District Court for the Northern District of California, Southern Division. The plaintiff-appel-

lant, The Magnavox Company, is an Arizona corporation which, at the time of the commencement of the suits, had its principal place of business in Oakland, California. One suit is against Ernest Ingold, Inc., a California corporation, a distributor of the alleged infringing product, to-wit, Atwater Kent loud speakers manufactured by the Atwater Kent Company of Philadelphia. The other suit is against Stromberg-Carlson Telephone Manufacturing Company, a corporation of New York, manufacturer of the alleged infringing devices, to-wit, Stromberg-Carlson loud speakers. A Pacific Coast distributor of the Stromberg-Carlson loud speakers, to-wit, Garnett Young & Co., a California corporation, is also a defendant in this suit.

These loud speakers are used principally today in connection with radio receiving sets and for public address work.

In both suits the charge of infringement is based upon two patents, to-wit, Number 1,266,988, filed July 3, 1916, by Pridham and Jensen as inventors and issued May 21, 1918, to Commercial Wireless & Development Company, of San Francisco, California, which concern subsequently assigned to plaintiff-appellant, The Magnavox Company. The other patent is Number 1,448,279, filed April 28, 1920, by the same Pridham and Jensen, and issued March 13, 1923, to plaintiff-appellant, The Magnavox Company.

A third patent, to-wit, Number 1,579,392, dated April 6, 1926, was set up in the bills of complaint, but was withdrawn from suit prior to the trial.

The first-mentioned patent is entitled "Amplifying Receiver" and the second one, "Electrodynamic Receiver". Both have to do with loud speaking telephone receivers of the dynamic or moving coil type. At the trial the issues were limited to Claim 8 of each of these two patents.

The consolidated cases were tried before Honorable A. F. St. Sure, partly on depositions and partly on testimony taken in open court. The District Court in a memorandum and order appearing in the record at page 68, held:

"I find it unnecessary to pass upon the validity of the patents, limited as their interpretation must be by the state of the prior art. And after careful study of the patents, the prior art, the law, and the facts, I have reached the conclusion that there is no infringement of Claim 8 of either patent, and so find. The complaints will be dismissed with costs to defendants."

Findings of facts and conclusions of law were submitted by both sides, those proposed by plaintiff appearing at page 70. These were overruled and exceptions noted. Defendants' proposed findings appear at page 75. These were approved and entered herein. Said findings admit the ownership of the patents in plaintiff and jurisdiction of the parties and recite that no finding is made as to validity and that the claims in suit have not been infringed by the devices complained of. A final decree was entered, dismissing the bills of complaint in both cases.

The case now comes before this Court on an appeal from the final decrees dismissing the bills.

ERRORS RELIED UPON.

The assignment of errors appears at page 443. In substance the errors assigned and to be relied upon herein are as follows:

(1) That it was error to dismiss the bills and deny the relief prayed for.

(2) That it was error to find non-infringement of the particular claims of the two patents in suit, in the light of the law and the evidence.

(3) That it was error to hold that the patents in suit are or ought to be so limited by the state of the prior art as not to be infringed by the devices complained of, in view of the evidence to the effect

(a) That the patents in suit were the first in the art to disclose those features of construction which made it possible to manufacture commercially and supply the public with a workable loud speaker of the moving coil or dynamic type;

(b) That the patents in suit accomplished new and useful results of an important character;

(c) That a demand had long existed for a loud speaker of the moving coil or dynamic type which had not been supplied by structures shown and described in the prior art patents and publications and had been supplied by the structures of plaintiff's patents;

(d) That the structures covered by the patents in suit filled a long-felt want and were instantly adopted by the public and extensively used.

ARGUMENT.

There is nothing in the memorandum and order, nor in the findings of fact and conclusions of law, to indicate on what the conclusions were based to the effect that the patents in suit were limited by the prior art. The only prior art, as shown by the record, has to do with impractical and inefficient devices which were never produced commercially; and as one Court remarked in a similar situation, "One cannot make a good omelet out of bad eggs."

It would appear that the Trial Court, under a misapprehension of the law of patents, failed to consider the great benefits which these patents bestowed upon the public. If due consideration had been given to the rules of law in that respect, the finding of infringement would have followed as a matter of law, inasmuch as defendants' devices embody each and every element set forth in the claims in suit or an equivalent therefor.

In the findings of facts and conclusions of law submitted by defendants and adopted by the Trial Court, the scope of plaintiff's patents and the matter of infringement have been treated as questions of law. It is our earnest belief that the questions presented on this appeal are largely questions of law and that if the Trial Court had correctly applied the law as enunciated by this Court and the Supreme Court of the United States, a finding of infringement would have been the inevitable result.

GENERAL NATURE OF THE INVENTIONS INVOLVED
IN THE PATENTS IN SUIT.

Re Patent 1,266,988.

A copy of the first patent in suit, to-wit, Number 1,266,988, appears in the Book of Exhibits at page 357. This patent is known as the "flat coil" patent. Except for the feature of Claim 8 thereof, it represents an obsolete type of instrument. While it operated quite satisfactorily as compared with anything then or theretofore known or used in the way of a loud speaker, it was not until Pridham and Jensen arrived at the "round coil" construction of the second patent in suit, to-wit, Number 1,448,279, that the instrument might be said to be a commercially successful device capable of functioning under any and all conditions, in the hands of the public. In this connection, Mr. Pridham testified (R. 350):

"We found that in shipping these instruments which were constructed according to the first patent, the mechanical construction was such that the coil would not stay fixed, the air gap would not stay fixed. It was a horseshoe magnet and we had quite a bit of difficulty in the mechanical stability of the instruments. They would work perfectly in the laboratory and for demonstration. As a matter of fact, we sold about 200 of them altogether. They were not the mechanical type to stand up. They were the horse-shoe electro-magnet type and we discontinued that type after making about 200 from 1916 to 1919. The instruments that followed had a cylindrical pot and a cylindrical core." (R. 350.)

Referring to the drawings of the first patent, the horseshoe magnet 11 is provided with pole tips 12

spaced a slight distance apart to receive a flat or wedge-shaped coil 13. This coil is fastened rigidly to a sound reproducing diaphragm 23. The horseshoe magnet is energized by suitable field coils so as to create a strong magnetic flux in the gap occupied by the flat coil 13. Therefore, when telephonic currents or voice currents pass through the said coil 13, they cut the lines of force in the gap and the result is to vibrate the coil and its attached diaphragm so as to produce audible sounds corresponding in character to the voice currents but in a greatly amplified form.

The fine wires or strips 27 which lead to the coil 13 are carried along one face of the diaphragm, being adhesively secured thereto by shellac or otherwise, so that they move and vibrate with the coil and diaphragm. The diaphragm, of course, does not vibrate so violently at or near its periphery, it being held rigidly by the plates 25. Therefore the thin strips or lead wires at the points where they leave the diaphragm and pass on to the stationary binding posts 29, will be subjected to very little flexing; whereas if a direct connection were made between the moving coil and the stationary binding posts, there would be such an amount of bending and flexing of a very rapid nature as would cause frequent breakage of the wires, making it necessary to ship the instrument back to the factory for repairs. It is to this manner of arranging the lead-out wires of the moving coil so as to eliminate breakage or failure of the instrument, that Claim 8 of this patent is directed.

Re Patent 1,448,279.

A copy of this patent appears in the Book of Exhibits, at page 6. It will be seen that there is a magnetizing structure consisting of a pot-like casing or cylinder marked 14, closed at its ends by end plates, one of which is removable. Within the cylinder is an energizing coil marked 16, surrounding a core piece marked 12-17. One end of this core piece enters a circular aperture in the removable end plate, which aperture is only slightly larger than the top of the core-piece. Suitable means (ring 11) are provided within the casing for mounting this core-piece in exact concentricity in the circular aperture so that a very narrow air gap is left, into which is fitted a circular coil marked 4. This coil carries a number of turns of very fine wire through which the telephonic or voice currents pass. The circular coil is rigidly attached to a diaphragm 3 of the sound reproducing type. This diaphragm is suitably supported in a frame, referred to in the patent as a "sound box", which sound box or frame is directly attached to the removable end-plate of the pot-like structure.

When the coil 16 is energized from any suitable source of direct current, a strong magnetic field is created in the air gap formed between the top of the core-piece (called "inner pole") and the surrounding end plate (called "outer pole"). When the voice current is passed through the coil immersed in this strong magnetic field, it cuts the lines of force at right angles, with the result that the circular coil is caused to vibrate in a direction parallel with the walls forming the air gap, thus vibrating the sound re-

producing diaphragm and reproducing audible sounds corresponding in character to the voice currents. These sounds are of great intensity and are in faithful reproduction of the voice which originated the currents.

The characteristic feature of the so-called "dynamic loud speaker" is the moving coil centered in a very narrow air gap, across which gap a strong magnetic flux is created. The common type of receiver such as we find in telephones and in the earlier practices, where some sort of announcing system was desired, is what is generally referred to in the record as the "magnetic type", or "iron armature type", and is characterized by a vibrating armature which moves towards and from the pole pieces of a magnet. The force of this approach and recession of the armature toward the pole piece is not a straight line function of the voice currents, but obeys the inverse square law of magnetic attraction—this makes for unfaithful reproduction. On the other hand, the force acting on the moving coil of the dynamic type is a straight line function* of the voice currents and since the coil moves parallel with the walls of the air gap and not toward or away from them, the whole action of the dynamic speaker insures faithful reproduction.

Moreover, in the dynamic type of speaker a very strong magnetic field is used, and since the motion of the voice coil is parallel to the pole faces, a large amplitude of motion may be obtained. These features

*An explanation of the term "straight line function" as used above means that the force acting on the driving agent increases or decreases directly as the voice current increases or decreases.

have made the moving coil or dynamic speaker ideally suited for all forms of reproduction, whether it be for public address work, where great volume is needed or for the radio receiving sets or electrical phonograph where faithful reproduction is the prime requisite.

The evidence abundantly shows that the dynamic type of loud speaker has practically entirely supplanted the so-called "magnetic" or iron armature type, for loud speaking purposes, and that prior to Pridham and Jensen's inventions there was not on the market nor available to the public, any kind of a dynamic loud speaker.

**PRACTICAL ART PRIOR TO PRIDHAM AND JENSEN'S
INVENTIONS.**

Mr. Pridham, one of the patentees, has been engaged in telephone and wireless work for many years. Concerning his experience he testified:

"I have been connected with the art of communication, especially electrical communication, for 35 years, being employed by the Western Electric, the Chicago Telephone Company, and other telephone companies. I am a graduate of Stanford University, Department of Physics, 1909. I was employed by the Poulsen Wireless Telegraph Company in 1910, where I met Mr. Jensen, who is co-inventor with me in these patents. We were sent to Europe to study the wireless companies and the methods of operation in 1910. In 1911 there was formed the Commercial Wireless & Development Company by

some San Francisco men, among whom were Mr. Richard O'Connor, Matt I. Sullivan, and others. We established a laboratory in Napa in 1911 for the purpose of undertaking a study of the reproduction of radio impulses and general problems in communication. While there we made a very interesting discovery of the effect of telephonic currents on a conductor when disposed in a magnetic field." (R. 252-3.)

That was the beginning of their experiments in dynamic or moving coil loud speakers which they carried on earnestly for eight or ten years before arriving at a construction deemed by them and the public to be commercially practical or useful in the hands of the public.

Concerning what was available to the public in the way of a loud speaker at the time Pridham and Jensen entered the field, Mr. Pridham testified:

"There were in use at the time we were working on these loudspeakers various types of magnetically-operated loudspeakers which consisted of a magnetically-operated armature which was attracted to the poles which were part of a magnetic structure. The telephone current went around these energizing poles of the magnetic structure, and attracted the iron armature to the pole pieces. That was generally known as a magnetic type of armature. There were several of those on the market. I have seen a number of them in operation.

Q. Were they or were they not satisfactory?

A. I think they were not satisfactory. That is my personal opinion as a person well versed in that art. They would reproduce sound. They

were never used with any great commercial success that I know of. I saw installations in the White Sox Ball Park in Chicago. I saw installations of these particular instruments in the Morrison Hotel. They never did supply what I thought, and what a great many other people, I imagine, thought was a commercially successful loud speaker.

Q. To what extent, if you know, are such magnetically-operated annunciators or loudspeakers used at the present time?

A. I would say from a percentage standpoint that they are practically obsolete. I do not believe there is one-tenth of one per cent. of the loud speakers on the market today operated by a magnetic armature." (R. 344-5.)

Mr. Metcalf, a witness on behalf of plaintiff, testified at page 390 that he first became interested in radio in 1908. He received his radio operator's license in 1912. His qualifications include post-graduate work at the University of Illinois and the University of Minnesota. He has been an instructor at North Dakota Agricultural College and an instructor in the Air Service School for Radio Officers, at Columbia University, and was also a radio officer at Bolling Field, in charge of radio development work in the United States Air Service, during the late war. As to when a dynamic speaker of any sort first came to his attention, he testified:

"When I was at Bolling Field, any equipment which had to do with radio that had been brought to the attention of the air service was brought to Bolling Field to my laboratory for test. Mr. Pridham, and I think Mr. Steers, who at that

time was president of the Magnavox Company, brought out to the field a number of dynamic speakers and a two-stage amplifier. We set up these speakers on Bolling Field and made a number of tests where some of our men walked over the field to a distance of two and three miles listening to music and speech as it came from the speakers. On the basis of that demonstration I recommended that these speakers be used in the opening, I believe, of the Fifth Victory Loan which took place—Let me refer to my note-book here—April 21, I believe.

Q. What year?

A. April 21, 1919. In that demonstration a radio receiving set was installed on the steps of the Treasury Building and connected to a battery of speakers, at least with several Magnavox speakers, and after the set up had been made I was taken back to Bolling Field by a Government automobile, got in a plane which was equipped with a radio transmitting set, and flew over the Treasury Building at a height of approximately 2600 feet and read into the microphone of the radio telephone the President's cable which had not been released to the press or the public until that reading. That was caught on the Treasury steps by the receiving set and reproduced to the large assembled crowd as I was reading it. To the best of my knowledge the air service, or airplanes had not engaged in such communication before that time." (R. 392-3.)

Mr. Metcalf, speaking of a time prior to his work at Bolling Field, testified:

“A. I had a problem on my hands at Columbia University as instructor in the air service school

there, of instructing a large number of students in code reception. I built a receiving set which we were allowed to have at that time, tuned to German and French stations. We received those in the office. I tried through the director of air service and through the agencies that I could, to get hold of a loudspeaker. I finally succeeded in getting an annunciator, a horn type speaker which was made by the Western Electric Company; it was the best, and as far as I could find out, the only thing available at that time. It was a magnetic type of speaker, and if we tried to crowd it, to put any amount of energy in it, to make it talk up loudly, it would rattle, the armature would hit the pole piece, and it was not satisfactory and we did not meet with any satisfactory loud speaker until we found a Magnavox dynamic at Bolling Field in 1919." (R. 399-400.)

Mr. Linden, Supervisor of Radio, Sixth Radio District, Department of Commerce, whose practical experience in radio is lengthy and goes back to 1906 or 1907, testified:

"I cannot answer as to the exact date the first loudspeaker of a moving coil type came to my notice, but it was considerably before the year 1921. Pardon me, I would not say 'considerably' in years, but some time before 1921. It was called a Magnavox loudspeaker of the dynamic type. At this time, when I first learned of the Magnavox dynamic speaker, there were no other loud speakers on the market that I knew of manufactured as such.

There was a need in the trade for a loudspeaker prior to the time when I first learned of the Magnavox." (R. 414.)

Mr. Warner, now engaged in the retail radio business, testified at page 419 that he had been connected with radio, first as an amateur, as far back as 1909 or 1910, and that:

“The first commercial loud speaker of a moving coil type to come to my attention was the ‘Magnavox.’ It was also the first one that I had any connection with in retail sales or uses. I first heard of the Magnavox loudspeaker about 1920; that is, the R-2 and the R-3, I believe, if the numbers are right.

Prior to that time there was need for a loudspeaker. We would have liked to have had at that time something to make something audible to crowds.” (R. 419.)

Mr. Zemansky, at present in charge of the Radio Department of the White House, San Francisco, testified that since 1913 he had been engaged in the radio and electrical business. Referring to the situation prior to 1919, he stated that as far back as 1912, Station KDN was broadcasting election returns, and:

“I can remember the folks calling in the neighbors to hear this. We would pass the earphones from one to the other. At that time we could have used a loudspeaker very nicely.

Q. To your knowledge was there any loudspeaker made commercially and sold prior to the time you first learned of the Magnavox?

A. There was a form of speaker that we made up, ourselves, which was sold. It was more or less of a magnetic earphone with a paper cone on it. You could set up any kind of earphones. Then there was the Baldwin. That was the only type of speaker we knew of at that time.” (R. 424.)

The Baldwin was an earphone of the magnetic type.

Mr. Eiferle, who is engaged in the radio business, testified that his experience with radio goes back to 1908; that he installed Magnavox loud speakers in the Oakland Auditorium in 1920, and that:

“At that time there were no other loudspeakers being made commercially or being sold on the market. In fact, before I even was in the sale of radios there was a big demand for speakers. There were none on the market, at all, with the exception of the earphone type. The earphone type was not satisfactory, because it was not audible enough.” (R. 426.)

Prior to Pridham and Jensen, sporadic attempts were made to solve the problem, but these attempts never went beyond the paper stage with the possible exception of those of Dr. Lodge, of England. His attempts started in 1898 and ended with a crude laboratory model, wherein a large panel or the wall of a room was intended to form a part of his idea of a loud speaker, and to operate it required the constant attendance of an expert. These prior efforts ended in failure because others did not know how to solve the problem which was for the first time solved through the practical ingenuity and perseverance of Pridham and Jensen after years of thought, experimentation, and hard work, and at great expense and sacrifice to themselves and their families.

Marconi did no more for radio or wireless transmission and reception than did Pridham and Jensen for loud speakers. So much is clear from a reading of the Court's opinion in *Marconi Wireless Tel. Co.*

v. DeForest Wireless Tel. Co., 138 Fed. 657, wherein one of Marconi's early patents was sustained. In the course of the Court's opinion it was pointed out that:

“If now we examine the patent in suit in the light of this discussion, we shall find that every element of the claims in suit is taken from the prior art.” (R. 671.)

The actual achievement of Marconi appears to be summed up in the following statement by the Court:

“No prior existing system was complete, or had been shown or conceived to be commercially operative.” (R. 672.)

The same consideration would apply to the Pridham and Jensen patents.

This Court, in *Butler v. Burch Plow Co.*, 23 Fed. (2d) 15, quoted with approval and applied the principle laid down in the case of *O'Rourke Engineering Const. Co. v. McMullen*, 160 Fed. 933, C. C. A. 2nd Circuit, as follows:

“‘Has the patentee added anything of value to the sum of human knowledge? Has he made the world's work easier, cheaper and safer? Would the return to the prior art be a retrogression? When the court has answered this question, or these questions, in the affirmative, the effort should be to give the inventor the just reward of the contribution he has made. The effort should increase in proportion as the contribution is valuable.

‘Where the court has to deal with a device which has achieved undisputed success and accomplishes a result never attained before, which

is new, useful and in large demand, it is generally safe to conclude that the man who made it is an inventor. The court may resort to strict, and it may even be to harsh, construction, when the patentee has done nothing more than make a trivial improvement upon a well known structure which produces no new result; but *it should be correspondingly liberal when convinced that the patentee's improvement is so radical as to put the old methods out of action.* The courts have frequently held that one who takes an old machine, and by a few even inconsequential changes compels it to perform a new function, and do important work which no one before ever dreamed it capable of performing, is entitled to rank as an inventor.' O'Rourke Engineering Const. Co. v. McMullen (C. C. A. 2d) 160 F. 933, 938.

'The keynote of all the decisions is the extent of the benefit conferred upon mankind. Where the court has determined that this benefit is valuable and extensive, it will, we think, be difficult to find a well-considered case where the patent has been overthrown on the ground of nonpatentability.' O'Rourke v. McMullen, *supra*." (Page 24.)

**ESSENTIAL REQUIREMENTS FOR A SUCCESSFUL
LOUD SPEAKER.**

The essential requirements for a commercially operative loud speaker are as set forth by Mr. Pridham at R. 271 and Mr. Metcalf at pages 394, et seq.

From the testimony of these experienced men it is clear that in order to produce a practical and efficient

loud speaker suitable for commercial manufacture, sale, and use, there must be provided the following:

(1) A peripherally supported diaphragm capable of a comparatively wide range or amplitude of movement with an annular moving coil *rigidly* connected to the center thereof for driving the diaphragm.

(2) This coil must be disposed between inner and outer magnetic pole pieces in a *very narrow* annular air gap formed between the two pole pieces. The narrower the gap the stronger the magnetic field, thus insuring the large movement of the moving coil necessary for a loud speaker.

(3) Since the moving coil when positioned in this *very narrow air gap* has but a *very slight clearance*, the pole pieces must be so spaced and maintained at all times as to prevent all likelihood of the rapidly moving driving coil rubbing against the pole pieces or being crushed, such as would occur if the pole pieces should change their relative positions.

(4) The diaphragm housing must be *connected directly with and supported on the magnetizing structure* and the parts secured together in a manner to properly position and at all times maintain the rapidly vibrating driving coil in the very narrow air gap between the two pole pieces.

(5) The whole structure must be arranged and combined in a unitary, self-contained, compact form so as to withstand the various strains imposed thereon in handling, shipping, transporting and using, and adapt it for use in the home.

In and by the second patent in suit, Pridham and Jensen were the first to accomplish all of these desiderata. The same are found to exist in like or equivalent form in the devices here charged to infringe.

While not essential in all cases, the feature of extending the lead-out wires from the voice coil along the surface of the diaphragm, is an extremely desirable provision, since it eliminates danger of breakage of the fine wires as set forth in the first patent in suit. In the devices charged to infringe, these lead-out wires are carried from the voice coil along the surface of the conical diaphragm to a point intermediate the apex and the base thereof, for the purpose of preventing breakage.

INFRINGEMENT.

At page 382 of the Book of Exhibits is a cross-sectional drawing of the Atwater Kent Loud Speaker charged to infringe in the Ingold case. This is Plaintiff's Exhibit 1. Plaintiff's Exhibit 2 is a similar drawing of the Stromberg-Carlson Loud Speaker charged to infringe in the Stromberg-Carlson and Garnett Young case. Through oversight, this Exhibit 2 does not appear in the Book of Exhibits, but a copy thereof is inserted at the end of this brief. There is no important difference between the two devices, and for the purposes of this case they may be considered as one and the same.

A sectional drawing of a Magnavox Loud Speaker as commercially manufactured at the time of the

trial and prior to the infringement complained of, appears at page 386, Book of Exhibits. The actual physical devices are in evidence as follows:

- Stromberg-Carlson Device, Plaintiff's Exhibit 3;
- Atwater Kent Device, Plaintiff's Exhibit 4;

A Magnavox Speaker in the form being offered to the trade prior to the infringement herein complained of, is Plaintiff's Exhibit 20. These physical exhibits are before the Court for inspection.

Mr. Pridham, in his testimony at pages 86 to 89, applied the claims in suit to defendants' structures by reference to the drawings, Exhibits 1 and 2. Like letters of reference appear on these drawings. The manner in which Claim 8 of the first patent applies to both drawings is as follows:

Claim 8 of Patent 1,266,988: In a receiver for telephony the combination with

- (1) a sound box H and its diaphragm G , of
- (2) a magnetic field (formed by outer pole piece A^1 and inner pole piece F)
- (3) a vibrating conducting coil J for the telephonic currents, disposed in said field and rigidly secured to the diaphragm,
- (4) and connections K and K^1 between the said coil and the operating circuit, comprising thin metallic strips K secured to the diaphragm (as indicated at M).

Claim 8 of Patent 1,448,279 applies to the drawings of both structures in the following manner:

An electrodynamic receiver comprising

(1) a shell or casing A having bottom and side walls formed of magnetizable material,

(2) a magnetizing coil C within said casing,

(3) a core D for the coil and extending from the bottom A^2 of the casing to the top thereof, formed at its upper end F with an inner pole piece,

(4) an outer pole piece A^1 in the form of a flat plate arranged upon the casing, having a central opening surrounding the inner pole piece and spaced evenly therefrom,

(5) means E within the casing for retaining said pole pieces in spaced relation,

(6) a sound-box H carried by the casing, said sound-box including a diaphragm G ,

(7) and a movable coil J rigidly connected to the diaphragm and arranged within the space between the two pole pieces.

It is apparent that the District Court's finding of non-infringement is not based upon the omission by defendants of any one or more elements of the patented combinations. The reason back of the finding must have been that defendants had changed the form of certain elements. In defendants' devices the combination still remains intact and operates in the same manner to produce the same results as in plaintiff's patents. The correct rule of law for determining infringement in a case of this sort is set forth in *Machine Company v. Murphy*, 97 U. S. 120,

where the Court, in reversing a decree of dismissal based on non-infringement, said:

“Except where form is of the essence of the invention, it has but little weight in the decision of such an issue, the correct rule being that, in determining the question of infringement, the court or jury, as the case may be, are not to judge about similarities or differences by the names of things, but are to look at the machines or their several devices or elements in the light of what they do, or what office or function they perform, and how they perform it, and to find that one thing is substantially the same as another, if it performs substantially the same function in substantially the same way to obtain the same result, always bearing in mind that devices in a patented machine are different in the sense of the patent law when they perform different functions or in a different way, or produce a substantially different result.

Nor is it safe to give much heed to the fact that the corresponding device in two machines organized to accomplish the same result is different in shape or form the one from the other, as it is necessary in every such investigation to look at the mode of operation or the way the device works, and at the result, as well as at the means by which the result is attained.”
(Page 125.)

DEFENDANTS' CONTENTIONS.

The contentions made in the Trial Court by defendants were:

(1) No infringement; based on the theory that defendants' cone housing was not the equiva-

lent of the element referred to in the claims as a "sound box". It was also argued that defendants' lead-out wires attached to the conical diaphragm were not the equivalent of the thin metallic strips specified in Claim 8 of the first patent in suit.

(2) Want of invention in view of the prior art, the principal references relied upon being the Lodge British patent and publications concerning his syntonic receiver.

RE KELLOGG PATENT 1,707,617.

It was contended by defendants at the trial that Kellogg Patent 1,707,617 (Book of Exhibits p. 249) applied for January 9, 1925 and issued April 2, 1929, was material herein to show (1) that a cone and cone-housing were not the equivalent of a sound box and diaphragm; and (2) that it raised a presumption of non-infringement in favor of defendants.

The evidence does not show that defendants have any interest in or rights under this Kellogg patent. On its face it appears to be owned by the General Electric Company.

Obviously the issuance of this patent does not fulfill the purpose which defendants contend for. At most it merely raises a presumption that Kellogg made some change or improvement over the patents in suit which the Patent Examiner regarded as patentable. It is well settled in this Court that a defense of non-infringement by virtue of a later patent is without merit. (*Bake-Rite v. Tomlinson*,

16 Fed. (2d) 556; *Dinuba Steel Products Corp. v. Killefer*, 56 Fed. (2d) 848. See also, *Walker on Patents*, 6th Edition, page 512.)

The Court of Appeals, Sixth Circuit, in the case of *Herman v. Youngstown Car Mfg. Co.*, 191 Fed. 579, gave the reasons why a later patent raised no presumption of non-infringement:

“There are expressions in some reported cases implying that by the later patent the government has granted a right to make and use the article so patented, and that such grant is inconsistent with any construction of the earlier patent which would forbid the manufacture of the later structure. *Such implication rests on a fundamental error.* A patent is not the grant of a right to make or use or sell. It does not, directly or indirectly, imply any such right. It grants only the right to exclude others. The supposition that a right to make is created by the patent grant is obviously inconsistent with the established distinctions between generic and specific patents, and with the well-known fact that a very considerable portion of the patents granted are in a field covered by a former relatively generic or basic patent, are tributary to such earlier patent, and cannot be practiced unless by license thereunder.”

RE GREAVES v. KELLOGG INTERFERENCE.

Defendants introduced in evidence the record of an interference entitled “*Greaves v. Kellogg*” (Def’s. Exhibit GG, pages 499 et seq., Book of Exhibits), to which plaintiff objected on the ground of immateriality and the fact that the transactions there

occurred long after the issuance of the patents in suit. (Objections overruled and exception noted, R. 251.)

It appears therefrom that one Greaves filed an application for patent, the exact nature of which is not shown; that this application was placed in an interference with the Kellogg patent above mentioned; that the interference was terminated on motion because the subject-matter in dispute appeared in a printed publication more than two years before Greaves filed. Greaves had assigned whatever rights he might have had to a patent, to plaintiff Magnavox Company, and it was contended by defendants at the trial that the situation created an estoppel against plaintiff to contend in this suit that a cone and cone-housing were the equivalent of a sound box and diaphragm. The argument is exceedingly tenuous and far-fetched, and no authority is cited in support thereof.

A complete answer appears to be that defendants were entire strangers to this transaction, and the infringing acts were not influenced by anything occurring in said interference. The acts herein complained of occurred prior to April 16, 1930 (that being the date of filing of the Bills of Complaint), whereas the interference proceedings on which defendants rely occurred between the dates of May 21, 1930 and January 27, 1931.

Just how anything of this nature could be fitted to the definition of an estoppel, is beyond comprehension. Moreover, no defense of this nature was set up in the answers. The Trial Court should have sustained plaintiff's objection.

The very point urged by defendants with respect to estoppel has been decided adversely to their contention in the case of *Temco Co. v. Apco Co.*, 275 U. S. 319, in an opinion by the late Chief Justice Taft. There the patentee of the patent in suit applied for a patent on an improvement. His application was placed in interference with another party and the other party was declared by the Patent Office to be the first inventor of the improvement. The defendant claimed to be operating under this improver's patent and urged it as a defense. The decision of the Supreme Court is sufficiently shown in the following, quoted from the syllabi:

“4. An improver who appropriates, without license, the basic patent of another, is an infringer and suable as such.

5. Patentee who applied for a second patent as an improvement ‘over’ the first, characterizing the new device as different in mechanical construction and functional results, *held* not estopped to insist on the old invention as against one who secured patent to the improvement through interference proceedings.” (Page 320.)

RE SOUND BOX.

The testimony shows that a diaphragm without some sort of support, whether we call it a sound box or a cone housing, is incapable of reproducing sounds in the manner required in a loud speaker, the reason therefor being that a diaphragm or cone unsupported or unrestrained at its periphery, sets up a blasting

and fluttering action which destroys the value of the tones given off thereby.

“Sound box” does not mean something that requires the use of a horn. There are many varieties of shapes and forms of sound boxes shown in the art prior to the date of the Pridham and Jensen patents in suit, as seen, for example, in a group of patents offered in evidence as Plaintiff’s Exhibit 18, which appear in the Book of Exhibits at pages 23 to 107. In none of these is any horn employed—other than what might be called a “directional baffle”.

These early patents include Maxwell 216,051, Dann and Lapp 338,660, Lumiere 1,036,529, and several others.

Mr. Pridham, in explaining his understanding of the significance of the term “sound box” in the art, testified:

“A. A soundbox, as known in the art from almost the very beginning, has always seemed to me to mean the enclosure of the diaphragm or the supporting means for the diaphragm. Now, referring to this chart which the draftsman made from pencil sketches which I made, we see the patent to Lumiere, No. 1,036,529. (P. 71, Book of Exhibits.) That represents Lumiere’s soundbox. It consists of peripherally mounted conical diaphragms; the horn is a short, trumpet-like form, which Lumiere states in his specification may be used or not. The diaphragm is very flexibly supported at its periphery. I have here a physical embodiment of the type of soundbox and diaphragm illustrated in the Lumiere patent. (Pliff’s. Ex. 11.) I purchased it in Los Angeles.

It was on the market for many years.* The sound-box in this device is represented by the supporting rings of the diaphragm. This is the diaphragm which Lumiere has patented in his patent. These rings are supported on the frame of this device. That was quite a successful loudspeaker. I might say that the Victor Phonograph Company sold many thousands of speakers using this type of soundbox in connection with the magnetic drive. This particular one had a dynamic drive.* I have operated that speaker in the laboratory and it operated very well." (R. 273-274.)

This Lumiere Patent 1,036,529, which was filed in 1910 and issued in 1912, states on page 1, line 30:

"My invention also relates to the *sound box* in which said diaphragm is mounted."

The sound box is described as consisting of clamping rings 9 and 10, and a backing ring 12 with radial arms 13. The trumpet 11 may or may not be used. Claims 5 and 27 to 30 of this Lumiere patent all refer to this holding structure for the diaphragm as a "sound box". This terminology was accepted by the experts in the United States Patent Office in allowing the Lumiere patent. Therefore no reason is seen why Pridham and Jensen's claims in referring to a sound box should not be construed as intended to embrace such a sound box as Lumiere illustrates and which defendants use in identical form, from an acoustical standpoint.

There is a chart (Plff's. Exhibit 12) reproduced in the Book of Exhibits, page 384, which serves to

*Subsequent to the filing dates of the patents in suit. (R. 363.)

show the similarity in principle and mode of operation between the diaphragm and its mounting, as specifically illustrated in plaintiff's patents, and the cone and cone-housing used by defendants. In explaining this chart Mr. Pridham testified:

"Continuing with my explanation of the chart, the next figure represents a diagrammatic drawing of the Magnavox soundbox, which shows the peculiarly-corrugated diaphragm 2 supported at its edges 3; the ferrule of the horn is shown at 1. When larger diaphragms are used we have found that it is not necessary to use a horn. A term has come into use, which is known as a 'baffle'; that baffle is simply a short horn, something like Lumiere shows in Fig. 1. We have shown in the lower lefthand figure what is known as a directional baffle. It is really a short horn with a very wide mouth. The mouth fits the diameter of the diaphragm. This particular type at the present time is sold and is being used for advertising purposes on trucks. Almost any day you can go down on Market Street and see one of those devices mounted on a truck going down the street. When you don't care for a directional horn and wish to have the sound propagated over a wider area, you use a wide baffle with the soundbox and diaphragm as illustrated in the lower righthand drawing." (R. 274.)

A baffle is used in connection with all radio loud speakers of the cone type, especially those of the size which we are here concerned with. This baffle consists of the cabinet in which the speaker is enclosed. If the speaker be removed from its cabinet a relatively weak and high-pitched tone is reproduced. Mr.

Metcalf (R. 402-403) gives an explanation of the function of the baffle, comparing its operation to that of a horn or trumpet.

In comparing the operation of a small diaphragm-and-horn combination with the larger conical-diaphragm-and-baffle combination, Mr. Metcalf testified:

“A. From actual performance point of view, for the finest and most faithful sound reproduction, there is no doubt whatsoever in my mind that the horn type of speaker is probably the best. My reasons for saying that are simply, from an examination of the industry which has developed in Hollywood for the recording and reproduction of talking motion pictures, while it is true that the General Electric Company has supported the cone diaphragm type or baffle type of speaker the Western Electric Company has supported the horn type speaker. Many of the present day dynamic speakers as made by the Western Electric Company, are used with a horn having conical diaphragms in them. The conical diaphragm is old, and has been well exemplified by Mr. Brown in some of the early receivers.” (R. 400-401.)

As to whether or not the cone housing functions as does the so-called sound box, in a combination of the sort we are here considering, Mr. Metcalf referred to a book by the eminent authority, Mr. Dayton C. Miller, published in 1916, a page of which book is reproduced in the Book of Exhibits at page 383. Mr. Metcalf said:

“A. Dayton C. Miller calls it a diaphragm, and a diaphragm housing. Now it seems quite sig-

nificant to me that the word 'housing' was used by Dayton C. Miller away back in 1916. He called it a diaphragm housing; with these cones they call them cone housings. The diaphragm in its housing was what we knew in 1920, 1921, 1922, 1923, along in there, as a sound-box, and Dayton C. Miller, in his designs, showed them with the front wide open, with the back wide open, and we knew at the time that the sound-box could be made open, closed, or any old way. I simply took it for granted that in any sound-box the diaphragm naturally was supported at its edges; I have not known of any sound-box, which I would call a sound-box, where the diaphragms were not supported at their edges, and consequently I took it purely for granted and did not so state.

Q. The importance of that support at the edge of the periphery is what?

A. It is very important because of the phenomenon which is known as blasting, and which causes certain areas of the diaphragm to flutter. (I call it flutter, I do not like to call it vibrate, because they do not go through any regular motion.) I think a good example of blasting or fluttering is such as when you take a piece of paper by its edges and shake it. There are nodes gathered at points and these cause a tremendous fluttering, and that fluttering can be heard; if you leave any of the edges exposed, that particular part of the edge will do that." (R. 404-405.)

It is appellant's contention that the facts in this case require the application of the rule laid down in

Imhaeuser v. Buerk, 101 U. S. 647, to the effect that where the patented invention consists of a combination of old elements, it is entitled to cover equivalents for those elements in the same combination; by which is meant any element, even though different in form, which was known to be a proper substitute for the one described in the specification. This rule has been applied in a number of cases in this Court, even where the substituted element effected an improvement in the combination. See

Smith Cannery Machines Co. v. Seattle-Astoria Iron Works, 261 Fed. 85;

Detroit Copper Mining Company v. Mine & Smelter Co., 215 Fed. 100;

Pedersen v. Dundon, 220 Fed. 309;

Williams v. Kaufman, 259 Fed. 859;

Petroleum Rectifying Co. v. Reward Oil Co.,
260 Fed. 177.

The rule is also stated in *Winans v. Denmead*, 56 U. S. 330, as follows:

“Where form and substance are inseparable, it is enough to look at the form only. Where they are separable; where the whole substance of the invention may be copied in a different form, it is the duty of courts and juries to look through the form for the substance of the invention—for that which entitled the inventor to his patent, and which the patent was designed to secure; where that is found, there is an infringement; and it is not a defence, that it is embodied in a form not described, and in terms claimed by the patentee.” (Page 343.)

Conical diaphragms of the form used by defendant, mounted in what is now called a "cone housing," were known in the art long prior to Pridham and Jensen's time. A good instance is Hopkins Patent 1,271,529, appearing in the Book of Exhibits, page 113. That is one of the patents involved in *Lektophone v. Rola*, 34 Fed. (2d) 764, wherein this Court held that even prior to Hopkins' time, which was 1913, conical diaphragms mounted in a suitable housing or support, were known in the art, referring to Maxwell, Dann and Lapp, and others.

Certainly, therefore, since the time of Hopkins, if not prior thereto, cones and cone housings have been known to be the equivalent for so-called sound-boxes and diaphragms, and one could be substituted for the other in any sound reproducing instrument. Therefore, the defendant in changing the type of diaphragm and mounting was simply doing what any person skilled in the art would be able to do at the time Pridham and Jensen made their invention.

The conical diaphragm such as defendants use, which conical diaphragm is supported peripherally in a housing and that housing in turn is secured to the removable plate of the pot-like structure, constitutes a known equivalent for "a sound-box carried by the casing, said sound-box including a diaphragm." The important thing is that in either case a rigid housing or frame supports the diaphragm at its periphery so as to permit it to operate in the most efficient manner, and this housing or frame is in turn secured to the magnetizing structure so that the diaphragm

and its driving coil are at all times held in proper working relation with the narrow air gap.

It is important to note that the claims in suit are broad enough to embrace all forms of so-called sound-boxes, whether they be used in connection with a horn or be of a form not requiring a horn. The drawings do not show a horn, although they illustrate a type of sound box which was obviously intended for use with a horn. However, nothing is said in the specifications or the claims which restricts Pridham and Jensen's invention to such a type of sound-box as could be used only in combination with a horn. As stated in *Walker on Patents*, 6th Edition, page 501 :

“The doctrine of equivalents may be invoked by any patentee, whether he claimed equivalents in his claim, or described any in his specification, or omitted to do either or both of those things. The patentee, having described his invention and shown its principles, and claimed it in that form which most perfectly embodies it, is, in contemplation of law, deemed to claim every form in which his invention may be copied, unless he manifests an intention to disclaim some of these forms. Combination patents would generally be valueless in the absence of a right to equivalents, for few combinations now exist, or can hereafter be made, which do not contain at least one element, an efficient substitute for which could readily be suggested by any person skilled in the particular art.”

The contention has also been made by defendants that Patent 1,448,279 should be restricted to a center pole piece, the tip of which is detachable. The answer

to this is that the detachable pole tip is expressly covered by claims other than Claim 8, and to read this into Claim 8 would be to make the claims all alike, which is contrary to the rules for interpretation of patent claims. A construction which would make two verbally different claims in a patent identical, is not to be followed, where there is nothing in the prior art which constrains to any such construction. (*Automatic Recording Safe Co. v. Burns Co.*, 231 Fed. 985, C. C. A. 2nd Circuit.)

Moreover, it was held by this Court in *Pedersen v. Dundon*, 220 Fed. 309:

“Neither the joinder of two elements of a patented combination into one integral part, accomplishing the purpose of both, nor the separation of one integral part into two, which together accomplish substantially what was done by the single element, will avoid a charge of infringement.”

The contention is also made by defendants that because plaintiff's Patent 1,266,988 illustrates and describes flat metallic strips 27 secured to the diaphragm, whereas defendant's metallic strips secured to the diaphragm are round, there can be no infringement. It is to be noted, however, that Claim 8 of this patent does not call for “flat metallic strips”, but rather, “thin” metallic strips. Certainly it can not be successfully contended that the very fine wires used in defendant's devices are not “thin”. Obviously, within the authorities above mentioned, to substitute thin round strips for thin flat strips in a particular combination, does not avoid infringement.

The Court of Appeals, 4th Circuit, in *Crown Cork & Seal Co. v. Aluminum Stopper Co.*, 108 Fed. 845, gives an instructive review of the Supreme Court decisions on the question of infringement, as follows:

“The court will look through the disguises, however ingenious, to see whether the inventive idea of the original patentee has been appropriated, and whether the defendants’ device contains the material features of the patent in suit, and will declare infringement even when those features have been supplemented and modified to such an extent that the defendant may be entitled to a patent for the improvement. *Clough v. Mfg. Co.*, 106 U. S. 164, 1 Sup. Ct. 188, 27 L. Ed. 134, and *Clough v. Mfg. Co.*, 106 U. S. 178, 1 Sup. Ct. 198, 27 L. Ed. 138, illustrate such a case, where certain elements in a valve were held in one case to be equivalents of those in a former patent, and to infringe, yet were so modified and improved as to sustain a later patent. In *Consolidated Valve Co. v. Crosby Valve Co.*, 113 U. S. 157, 5 Sup. Ct. 513, 28 L. Ed. 939, the improvements covered by the patents had been held by the court below to involve only mechanical modifications of the prior art, yet the supreme court regarded the Richardson invention as a ‘pioneer invention,’ and, although the defendant’s valves departed widely from the terms of the claims in suit, it was held that they had secured under a change in form, and by the transposition from one member to another of certain functions, the substance of the complainant’s invention, and the claim was construed to cover these modifications. Says the court (p. 171, 113 U. S., p. 521, 5 Sup. Ct. and p. 943, 28 L. Ed.):

‘Taught by Richardson and by the use of his apparatus, it is not difficult for skilled mechanics to take the prior structures, and so arrange and use them as to produce more or less of the beneficial results first made known by Richardson; but prior to 1866, though these old patents and their descriptions were accessible, no valve was made producing any such results.’ ” (Pages 866-7.)

Describing the Richardson invention and comparing it with the defendants’ device, the Court goes on to say:

“Richardson’s invention was a safety valve, which, while it automatically relieved the pressure of steam in the boiler, did not, in effecting that result, reduce the pressure to such an extent as to make the relieving apparatus practically impossible because of the expenditure of time and fuel necessary to bring up the steam again to the proper working standard. His valve was the first which had a strictured orifice leading from the huddling chamber to the open air to retard the escape of steam, enabling the valve to open and to close suddenly with small loss of pressure in the boiler. In the infringing patent the valve proper was an annulus, and the extended surface was a disk. In Richardson’s the valve proper was a disk, and the extended surface an annulus surrounding the disk. The defendant’s had two ground joints, and only the steam which passed through one of them passed through the stricture, while in Richardson’s all the steam which passed into the air passed through the stricture. The court says (p. 179, 113 U. S., p. 525, 5 Sup. Ct. and p. 946, 28 L. Ed.):

‘When the ideas necessary to success are made known, and a structure embodying those ideas is given to the world, it is easy for the skillful mechanic to vary the form by mechanism which is equivalent, and is therefore, in a case of this kind, an infringement.’

These conclusions were based on the fact that no prior structure had produced the same result as Richardson’s, although the court, of course, did not mean that Richardson had produced the first valve.” (Page 867.)

The Court then analyzes the case of *Machine Company v. Lancaster*, 129 U. S. 263, as follows:

“*Machine Co. v. Lancaster*, 129 U. S. 263, 9 Sup. Ct. 299, 32 L. Ed. 715, was for infringement of a patent for sewing on buttons. This was not the first button-sewing machine, but the court described it as a ‘pioneer machine,’ and held that it was infringed by a machine that made use of elements which were individually considered quite different from those in the patent, saying (p. 290, 129 U. S., p. 308, 9 Sup. Ct., and p. 725, 32 L. Ed.):

‘The mechanical devices used by the defendants are known substitutes or equivalents for those employed in the Morley machine to effect the same results. And this is the proper meaning of the term ‘known equivalent’, in reference to a pioneer machine such as that of Morley; otherwise, a difference in the particular devices used to accomplish a particular result in such a machine would always enable a defendant to escape the charge of infringement, provided such devices were new with the defendant in such a machine, because, as no machine for accomplish-

ing the result existed before that of the plaintiff, the particular device alleged to avoid infringement could not have existed or been known as such a machine prior to the plaintiff's invention.' ” (Page 867.)

**MERIT AND IMPORTANCE OF THE INVENTIONS
OF PLAINTIFF'S PATENTS.**

As said by the late Chief Justice Taft in the case of *Eibel v. Paper Co.*, 261 U. S. 45:

“In administering the patent law the court first looks into the art to find what the real merit of the alleged discovery or invention is and whether it has advanced the art substantially. If it has done so, then the court is liberal in its construction of the patent to secure to the inventor the reward he deserves. If what he has done works only a slight step forward and that which he says is a discovery is on the border line between mere mechanical change and real invention, then his patent, if sustained, will be given a narrow scope and infringement will be found only in approximate copies of the new device. It is this differing attitude of the courts toward genuine discoveries and slight improvements that reconciles the sometimes apparently conflicting instances of construing specifications and the finding of equivalents in alleged infringements.” (Page 63.)

And the Court adds:

“But a patent which is only an improvement on an old machine may be very meritorious and entitled to liberal treatment.”

We have already adverted to the fact that there was nothing in the prior practical art in the way of a dynamic loud speaker capable of functioning in the hands of the public. It was the contention of defendants that Lodge disclosed everything of importance to be found in plaintiff's patents, and that what he omitted could be supplied by any mechanic without the exercise of invention. However, the evidence shows that the Lodge experiments never progressed beyond the laboratory stage and that Pridham and Jensen, two skilled engineers, devoted many years of intensive study and experiment to the problem before they arrived at a combination which might be said to be successful, practical, and commercial.

Mr. Pridham gives a detailed account of the difficulties of the problem which confronted Pridham and Jensen from the outset of their efforts to produce a satisfactory dynamic loud speaker, and the repeated experiments which were necessary to perform before their efforts were crowned with success. At R. 253 to 259, Mr. Pridham relates:

“The problems that we had to attack were various, and were very difficult of solution. It took quite a bit of time; we had several mechanics; it took quite a bit of money. * * * One evening I called Mr. O'Connor up from the laboratory and told him we were four or five months behind in our bills, the mechanics had not been paid. * * * I told him then that we had just produced a very successful loudspeaker telephone. It rather interested him immediately to think we had produced something that would be commercially successful. He said that he would

send his son Charlie up to hear this instrument. When Charlie came up on the next Sunday we had this instrument arranged on the roof of the house, on the chimney. A very large horn was connected to the instrument. The voice was propelled through the air for a distance of four miles. At night in the Napa Valley records played on a phonograph could be heard throughout the Napa Valley, a distance of nine or ten miles. It created a very great sensation. Lieutenant-Commander Sweet, who had charge of radio work at Mare Island, came up to the laboratory and was much impressed with this loud-speaking telephone, because it was exceedingly loud. We were invited by the Exposition officials to give demonstrations at the Exposition from the Tower of Jewels. The reproduction from these instruments could be heard out on the battleships in the bay, and, in fact, the sailors even danced on the decks to the music. We gave a very important demonstration at the dedication of the City Hall in 1915. Mayor Rolph and other important men spoke to a crowd of over 50,000 people gathered there. Alice Gentle sang national airs over the instrument. There was a great deal of interest, both local and national. The Navy at that time was interested in docking vessels by means of our instruments. They ordered some instruments, and vessels were docked at the Bremerton Navy Yard very successfully. During all of these demonstrations we had one very great difficulty, the vibration of the coil in the magnetic field was very intense. That coil was wound with a fine wire in order to expose a great length of wire to the effect of the magnetic field. When these fine wires were brought directly out to the

operating circuit we had trouble with the wires crystallizing and breaking off. That was a very great and serious difficulty for us. We finally solved this difficulty by the ingenious method of connecting the operating circuit wires to the coil, where the coil wires were attached to the diaphragm. This completely obviated any danger of the breaking of the wires. This method and means has been used ever since in practically all dynamic speakers to date." (R. 253-255.)

Concerning the second patent in suit, Mr. Pridham testified:

"A. After giving these matters considerable thought and solving this problem of the breaking of the wires, we thought we had at last arrived at a very successful loudspeaker. This was in 1915 and 1916 that this particular action happened. However, we were very far from a successful instrument in the matter of shipping the instruments abroad, and having them handled by the public. We worked, you might say, day and night on this problem. The first flush of victory, you might say, was over. The people who were backing the company began to be a little tired of not having any commercial success. It spurred us on more and more to finally arrive at a successful instrument. I remember well at that time both Mr. Jensen and I were very hard-pressed. We simply had to have something to get a real commercial instrument that could be sold in quantities. It was a very difficult matter to find a solution for this. * * * At this time practically all work on telephone loudspeakers ceased and we were wholly engaged in developing what is known as the anti-noise transmitter for the

Government, which was very successful in aeroplane communication. I mention this simply to let you know the reason for a hiatus in our experiments in the loudspeaker. * * * In 1919 we again took up very active work in the development of this loudspeaker. At this time we developed the invention which is outlined in the second patent, which is No. 1,448,279. This patent was applied for April 28, 1920. For practically two years before that time, at least a year and a half, we were busy developing this new type of loudspeaker. We succeeded in developing a very efficient loudspeaker, which has stood the test of time. * * * It was known throughout the world as the Magnavox dynamic loudspeaker. It was shipped practically to the ends of the earth." (R. 257-259.)

Concerning the practical importance of the combination of Claim 8 of the first patent in suit, Mr. Metcalf testified:

"When this device was used as a loudspeaker, particularly when large amounts of power were put through it, the diaphragm moved over quite a wide range, and I have seen in the laboratory devices of this character in which the leads have been brought out in a number of different ways. I have seen the fine wire of the moving coil brought out directly. I have also seen the wires break under no more than a few seconds of operation under heavy signals, heavy input, and very often, most often, the fine wire of a moving coil was brought out to a point on the diaphragm and then it was soldered and attached to a strip or another wire, or anything which had more strength and was more flexible than the lead wire.

I have seen a number of different materials used for that purpose, not lately, but in the days when I first came with the company, from what I have been able to find out, such a device has become absolutely a necessity for dynamic speakers.”
(R. 406-7.)

In referring to the second patent in suit, Mr. Metcalf pointed out those features of the Magnavox patented structure responsible for the success of the device and which are not to be found in the prior art, as follows:

“A. In the first place, the Magnavox speaker has good electrical efficiency. The air gap is small. The watt pounds of wire involved will be low because of the magnetic efficiency. The moving coil is set in there with a minimum of clearance. Now a minimum of clearance simply means that the air gap can be brought right up to the edges of the coil, the sides of the air gap can be brought up to the edges of the coil, and if there is not anything to *keep that coil from wobbling sideways*, it is impossible to keep the coil in such close relationship, and consequently it is necessary to keep three things in concentric relation, not only to put them there *but to keep them there*; the central pole piece B, the hole in the top plate A, and the moving coil must be made solidly, kept by some means or other from moving sideways; if you do that, then the air gap can be made very narrow and motion up and down to the extent of one sixteenth to one quarter of an inch can be had without danger of rubbing, and H spaces that pole, that center pole piece, and keeps it in concentric relation, and the solid relationship of the spider which fastens the moving coil on the

diaphragm, keeps the coil in the field at all times.* It has all forms of efficiency, it has acoustical efficiency, it has a diaphragm which is corrugated, which is free to move up and down. As I remember it, the Magnavox metal diaphragms, such as have been shown in evidence here, were several thousandths thinner at their edges than they were in the center, to free up the motion. It was well known even when I first came to the Magnavox Company, that a diaphragm should be free to move. As a matter of fact when I was in the laboratory there I made a large number of diaphragms of various kinds and various sizes and helped to test them out. I remember particularly one device which was made, and I think it was probably made before I came there, at least I saw it around 1920, which had the whole thing enlarged, both the field, the diaphragm, the sound box and everything." (R. 398-399.)

THE PRIOR ART RELIED UPON BY DEFENDANTS.

Of the many patents set up in the answer and offered in evidence, none appears ever to have made any impression on the art. In any event, the evidence fails to show that they were attended by any practical or commercial use. It appears that Lodge built a laboratory model of a loud speaker, but it was of such an impractical and incomplete character that Dr. Lodge himself, giving his deposition in this case, said:

*The reference letters used by Mr. Metcalf are those found on the drawing of the Magnavox instrument appearing in the chart, Plaintiff's Exhibit 16, page 22, Book of Exhibits.

“I should not call it an apparatus. I should call it a temporary arrangement for a laboratory demonstration.” (R. 312.)

The best and closest references, according to defendants' expert, Fouts, are Siemens' British patent 4685 of 1877, as against the first patent in suit, and the Lodge publications plus the United States patent to Pollak, as against the second patent in suit. (R. 161, 162 and 165.)

Prior art as against first patent in suit.

Defendants' expert admitted that Siemens failed to show the important feature of the first patent in suit, namely, bringing the fine, thin wires from the moving coil out along the diaphragm, and connecting them to heavier leads at a point between the center and periphery of the diaphragm, so as to overcome breakage. It is true that defendants' counsel argued that the Edison patents, British 2909 and United States 203,015; Rogers 297,168; Richards 521,220, and Shreeve 602,174, were extremely pertinent; but the expert Fouts made no mention of any of these when selecting his best and closest reference.

These last-mentioned patents all show *transmitters* of the carbon granule type wherein very slight movements of the diaphragm, caused by sound waves from the speaker's voice, act upon the carbon in such a way as to set up variable currents in a telephone circuit. These carbon granules are placed in a small chamber at the center of the diaphragm, and current-carrying wires lead from this chamber to a point on the housing which encloses the diaphragm. These

wires may in some instances parallel the diaphragm, on account of the small and compact construction of the transmitter, but they do not function as in plaintiff's patent, nor are they intended to serve any such purpose as the patentees had in mind. Mr. Metcalf points out this distinction at R. 407, where he says there is no such motion of the diaphragm as would cause any breakage of wire, for the reason that:

“They are telephone transmitters, and even though you got up close to them and spoke as loudly as you could, you could not move that diaphragm, I do not believe one-tenth or even one hundredth, as far as the diaphragm of these dynamic speakers move.” (R. 407.)

Since there is no moving coil in a magnetic field in any of the patents to Edison, Rogers, Richards and Shreeve, it is obvious that the problem which Pridham and Jensen met and solved in connection with a loud speaker was entirely absent in these transmitter patents, and they cannot properly be used as anticipations.

The contention which defendants' counsel makes here, to-wit, piecemeal anticipation, is the exact opposite of the position he so successfully assumed as counsel for the plaintiff in the case of *Doble v. Pelton*, 186 Fed. 526 (N. D. Cal.; affirmed 190 Fed. 760) (C. C. A. 9th Circuit).

Prior art as against second patent.

The Lodge and Robinson depositions taken by plaintiff in London, and introduced at the trial, show that the Lodge Syntonic Receiver as shown in Fig. 5 of

The Electrician, page 123, Book of Exhibits, was not a loud speaker in any sense of the word, for Dr. Lodge himself said:

“They were mostly not for talking, but for hearing a special tone. There was a tuning fork in some of them so that it would not respond to any but a particular tone.” (R. 305.)

“I was thinking of a call for the syntonic telegraphy.” (R. 311.)

“I was not exactly thinking of a loud speaker in connection with that arrangement.” (R. 311.)

When Dr. Lodge was asked on cross-examination if an apparatus of this sort, namely, the syntonic receiver, were attached to the output side of a powerful modern wireless set, it would give audible sound, he replied:

“It would give audible sound, *but it is not adapted for speech*. I think it is more adapted for a single tone.” (R. 314-15.)

No practical use was ever made of this syntonic receiver, and Dr. Lodge testified that about the beginning of the war some of these devices were turned over to the War Department:

“for hearing and recording the sound of a gun at several stations simultaneously so that from the delay in receiving the signals at different distances, they could estimate the position of the gun.” (R. 306.)

It appears from the testimony that Dr. Lodge's scheme was good in theory but that the apparatus which he supplied to the War Department was insufficient, for he admits:

“They used a different microphone—a different receiving instrument—which was simpler and better than those I sent.” (R. 306.)

The Lodge “loud speaker” (so-called) is shown in the drawing, Plaintiff’s Exhibit 7.* As Mr. Robinson, the assistant to Dr. Lodge, testified on cross-examination, in comparing this device with the Lodge Syntonic Receiver:

“They are two different instruments; that is a Lodge loud one (pointing to Plaintiff’s Commission Exhibit No. 1)* and that is not (pointing to Fig. 5 of the ‘Electrician.’ ” (R. 295.)

“The apparatus shown in the figure (Fig. 5) *is not a loud speaker*. It is referred to as a sensitive type of telephone equal to the Collier and no doubt it was if you put your ear on the board. You could not describe the Fig. 5 form as a loud speaker any more than you could a Collier.” (R. 296.)

“As far as I remember it was more a receiver to do with telegraphy.” (R. 300.)

In regard to the so-called “loud speaker” as distinguished from the “syntonic” receiver, Mr. Robinson described the apparatus as follows:

“A. 16. Well, the loud speaker that I made up to Sir Oliver’s instructions consisted of a movable coil fixed to a board about 4 ft. square and about $\frac{3}{8}$ ” in thickness; it may have been as much as $\frac{1}{2}$ ”, but that was about the size of it, and this coil was capable of moving in an annular gap of an electro magnet. I think that describes it.

Q. 17. How was the board supported?

*Drawing at page 19, Book of Exhibits.

A. 17. It was supported on three iron rods capable of adjustment for height in order that the coil could move freely in its annular gap.

Q. 18. What were these three rods mounted on?

A. 18. They were mounted on a table." (R. 279.)

As to the volume of sound produced by Lodge's instrument, Mr. Robinson testified, R. 290:

"It is not as loud as a person's speech, naturally."

It may, therefore, be said not to constitute a loud speaker, and the entire scheme was one of experiment and an attempted discovery which was never completed, because of lack of promising results.

Dr. Lodge himself corroborates Mr. Robinson in respect to the apparatus shown in Plaintiff's Exhibit 7, page 19, Book of Exhibits, and when asked if he recalled an apparatus being constructed in accordance with that drawing, said:

"I should not call it an apparatus; I should call it a temporary arrangement for a Lecture demonstration. After I had seen this drawing I remembered that kind of thing being shown at Liverpool. I had it in my Lecture room for showing to the students. It was rigged upon a Lecture table with a large board, 3 ft. or 4 ft. square, I should think, and with those adjustable supports holding it, but it was arranged for a temporary purpose. For the purpose of seeing how loud the speaker would be in the theatre. My recollection is that it was a big theatre and you could hear it all over, but that we never got

it so loud as one could speak. We got it loud enough to be audible, but not as loud as a man could shout. But what we got was the distinct utterance from it.” (R. 312.)

Part of the experimental device as actually constructed by Doctor Lodge and his associates is in evidence as Plaintiff’s Exhibit 13. Concerning this, Mr. Pridham testified:

“I have examined the Lodge instrument which is now marked in this case Plaintiff’s Exhibit 13. This instrument is a device made, according to Sir Oliver Lodge’s testimony, to use in his lectures. It is marked with the Roman numeral II. It indicates that it was exactly like the other instruments that were used in his so-called demonstrations. I would like to call attention to the fact that there was *no spacing means* within this cylinder such as Magnavox uses. The coil is loose in here, and would not operate to space the poles apart at all. This cap here, as far as anyone can tell, never had a sound-box mounted on it. Those two holes are for a spanner wrench to unscrew the top pole piece. The movable coil was put into the annular gap and moved up and down in there and was attached to a large sounding-board which was supported upon these retort stands, *and not connected in any way to the casing whatsoever.*” (R. 327.)

“Q. Would such a device as you have just described be susceptible of commercial manufacture, or shipment, or of use in a home?

* * * * *

A. It would not, for this reason: The instrument Sir Oliver Lodge made in London and

demonstrated in his lectures was a demonstrating device to illustrate a moving coil in a magnetic field. It operated so that a speech could be heard throughout a room—a theater, as he called it. He used ‘theater’ in the English sense, meaning a lecture room, as he states later on in his deposition. This instrument was not commercial in any respect that Sir Oliver Lodge demonstrated there. It had absolutely no means of holding a diaphragm as an integral part of the instrument. You could not ship it any place. Nobody could handle it except an expert. Experts set it up for his laboratory demonstration, and he demonstrated it.” (R. 327-328.)

Aside from the impossibility of maintaining the pole pieces of the Lodge device in properly spaced relation and keeping the moving coil in concentric position in the air gap, Lodge had a very inefficient instrument, as pointed out by Mr. Pridham as follows:

“The efficiency of the Lodge instrument would be very poor, for these reasons: It had a wide air gap; it had no means of holding pole pieces in correct spaced relation. The diaphragm was not mounted upon one of those poles. The coil was no way related in position with the air gap by any mechanical means associated with the instrument. Consequently, it would be very inefficient. His air gap is exceedingly wide, three-eighths of an inch, practically .375 of an inch, whereas in the modern instrument the air gap is .040 of an inch. It would take an enormous amount of wire for a magnetic field to get the same amount of density of magnetic lines in the air gap as is had with a very small quantity of

wire in the present day instruments—or Magnavox.” (R. 328-329.)

Lodge was constrained to use the wide air gap because of his failure to provide (a) spacing means for the pole pieces and (b) a physical connection such as a sound-box or housing between the diaphragm and the magnetic structure, whereby the moving coil would not shift its position within the air gap.

Regarding the Pollak patent, its lack of pertinency is pointed out by Mr. Pridham as follows:

“A. The United States patent to Pollak, 939,625, does not refer to a telephone reproducer; it refers to a telephone *transmitter*. The transmitter buttons are not located in any connection with the magnetizing device at all. Therefore, I hold that that is not a correct reference, because the claim 8 of the Magnavox patent distinctly states that the combination includes a diaphragm and sound-box mounted upon the outer pole of the magnetic structure. Nothing like that is shown in Pollak.” (R. 275.)

In referring to the Lodge British patent and the model shown in the drawing at page 19 of the Book of Exhibits, Mr. Metcalf testified:

“A. One of the necessary things for a commercial device to have is portability, something which can be shipped, and the Lodge device is an assembled procedure. The flat sounding board D is resting lightly on the supports, which we are given to understand are chemical retort stands, and one very interesting thing which I think can be proven very quickly is that unless the diaphragm there, or the sound board, is screwed

down it will creep, the jiggling would creep it off the support and the coil would rub in the air gap and it would in no way be commercial.” (R. 395.)

As for the Lodge Syntonic Receiver shown in Fig. 5 of “The Electrician,” appearing at page 123, Book of Exhibits, Mr. Metcalf said:

“A. A syntonic receiver might be compared, perhaps, to an automobile horn where it makes a noise of constant frequency. Now the mere fact that a device such as Lodge states in his first type of device, that when it was loaded with a moving coil it became useless for a syntonic receiver, does not in any way mean that it became a wonderful loud speaker. The chances are a thousand to one, if it became useless as a syntonic receiver, it became absolutely worthless as a reproducer of all frequencies. Now one of the surest ways to ruin the reproduction from any polytonic receiver, as you might call it, would be to load it, to dampen it, and if the addition of this coil made it so dampened that it would not act as a syntonic receiver, I can not see how in the world it would make it so that it would respond to all frequencies.” (R. 395-6.)

With regard to the Johnsen patent 1,075,786, Mr. Metcalf testified:

“That Johnsen patent is a puzzle if you read it carefully, because in it he states that magnetic material is to be put on the moving coil. First and foremost, any magnetic material on a moving coil of that type would lock and stick that moving coil to the casing so hard that it could not move. In the second place, there is no peripheral support

for the diaphragm and I can not see how you would get anything other than a pumping back and forth of that diaphragm D, and I can not see how you would get any sound out of it at all." (R. 396.)

In explaining the Pollak patent 939,625, the same witness said:

"Pollak shows a double-ended device with an air gap in each end. In the air gap are moving coils to which are attached what presumably might be taken as a diaphragm. It is impossible to tell from the patent whether those diaphragms move in phase or whether they move out of phase, and it appears that the coils are held in the gap by two strips which pass over the face of the top plate, and if that is so, the coils would not be able to move except in one direction; they would be held from going in toward the center of the device because of the strips; they could not go both ways from zero. There is nothing which indicates the sound box or anything of that sort.

Q. In other words, it would not be a loudspeaker at all, would it?

A. No. As I remember it, those things that look like diaphragms were portions of a telephone transmitter." (R. 396-7.)

In explaining the Oliver patent 951,695, Mr. Metcalf testified:

"A. The whole secret of a loudspeaker is a device which can give a substantial motion to a diaphragm. Oliver shows a diaphragm and sound box, the diaphragm having the main moving coil placed away out near the periphery, and it would be impossible for a device of that sort to operate

with any wide amplitude. In addition it has no means for spacing pole pieces, and if a device of that sort were shipped, the weight of the coil would undoubtedly fall on the central pole piece and drive it out of position. That was one of the things which often occurred." (R. 397.)

By means of a chart (Plaintiff's Exhibit 16), a copy of which is in the Book of Exhibits at page 22, Mr. Pridham shows the essential requirements of a successful loud speaker and illustrates in what manner they are present in plaintiff's second patent, and wherein Lodge, Pollak, Johnsen, and Oliver lack most of these essentials.

These essentials (referring to the chart) may be set forth as follows:

1. *Magnetic Requirements:*

Requires narrowest possible air-gap between pole pieces A and B to receive moving coil C.

2. *Acoustical Requirements:*

Requires diaphragm D with large amplitude of motion, driven at its center E and restrained at its periphery F by means of sound box or equivalent holder.

3. *Mechanical Requirements:*

Requires maintaining coil C in exact center of narrow air gap, as by means of physical connections C with top plate and maintaining pole pieces in concentric relation, as by means of spacing device H.

Inspection of the chart will show that the prior art patents, none of which was ever embodied in physical form, other than Lodge, so far as this record shows, fail in all three respects above mentioned. While these early experimenters no doubt recognized the need for the narrowest possible air gap, they could not supply it because they failed to provide any spacing device between the two pole pieces, and their diaphragms which carry the moving coil are not fixedly associated with the magnetic structure. Therefore, to get the device to operate at all they had to use a comparatively wide air gap, to allow for possible lateral maladjustment or displacement between the moving coil and the pole pieces. They all fail to support the diaphragm peripherally, with the possible exception of Oliver, and that is a mere ear-phone and the magnetic structure is not a cylinder or a pot-like structure, but a horseshoe.

Each and all of the prior art patents relied upon by defendants lack those features of mechanical construction which Mr. Pridham has testified are necessary to the production of an instrument which may function satisfactorily in the hands of the public and possess the inherent ability to withstand rough usage, as in shipment or when placed in the hands of unskilled or careless users, without permitting the delicate and finely-adjusted pole pieces and moving coil to get out of alignment. As Mr. Pridham at R. 259-260 testified:

“It would not get out of order; it was exceedingly robust. At one time in giving a demonstration at the Bureau of Standards an instrument

dropped out of the second story window while they were receiving radio signals, I believe, from Honolulu, or from some distant station. We went out and picked up the instrument and hooked onto the line again and it still operated. That shows the very robust construction of the instrument. That instrument, which is the subject of this patent, completely solved our difficulties in presenting to the world a successful dynamic loudspeaker.”

While this may be said to be an unusual example, the fact remains that such things have to be taken into consideration by the inventor who intends to entrust his product in the hands of the public.

In answer to an inquiry by the Court as to the elements contained in a successful dynamic loud speaker, Mr. Pridham testified:

“A. The elements contained in a successful dynamic loudspeaker consists of a magnetic structure in which there exists a narrow air gap. There must be means to hold the poles which form that narrow air gap in spaced relation. There must be a diaphragm mounted upon one of those poles. The diaphragm must, of course, be held in some supporting medium like the rings or sound-box. The coil must extend into the narrow air gap so as to be free to vibrate over its full range without coming in contact with the poles. That diaphragm can be either enclosed or exposed. A horn may be used on the diaphragm or the horn may be dispensed with, according to the size of the diaphragm.” (R. 271.)

It will be obvious that these elements are present in the second patent in suit and are also present in

defendants' structures, although most of them are lacking from the disclosures of the prior art. While it may be true that certain of these elements may be found in one of the prior patents and certain others in a different prior patent, the fact remains that there is *no one, single, prior patent or prior structure, standing alone*, which exhibits those elements necessary to constitute a commercial and successful and efficient loud speaker such as shown and claimed in the Pridham and Jensen patent and in substance embodied in defendants' structures.

The Supreme Court has many times declared the rule for determining anticipation or lack of invention, and it is succinctly set forth in *Hobbs v. Beach*, 180 U. S. 383, as follows:

“While none of the elements of the Beach patent—taken separately or perhaps even in a somewhat similar combination—was new, their adaptation to this new use and the minor changes required for that purpose resulted in the establishment of practically a new industry, and was a decided step in advance of any that had theretofore been made.” (Page 392.)

Likewise, in *Diamond Rubber Co. v. Consolidated Tire Co.*, 220 U. S. 428:

“Many things, and the patent laws abound in illustrations, seem obvious after they have been done, and ‘in the light of the accomplished result’ it is often a matter of wonder how they so long ‘eluded the search of the discoverer and set at defiance the speculations of inventive genius.’ *Pearl v. Ocean Mills*, 11 Off. Gaz. 2. Knowledge after the event is always easy, and problems once

solved present no difficulties, indeed, may be represented as never having had any, and expert witnesses may be brought forward to show that the new thing which seemed to have eluded the search of the world was always ready at hand and easy to be seen by a merely skillful attention. But the law has other tests of the invention than subtle conjectures of what might have been seen and yet was not. It regards a change as evidence of novelty, the acceptance and utility of change as a further evidence, even as demonstration."

**NEW RESULTS ACCOMPLISHED IN AND BY THE PATENTS
IN SUIT.**

Explaining the new results accomplished by the patents in suit, Mr. Pridham testified:

"A. A very distinct new result was accomplished in producing a mechanical instrument in which a vibration of the movable coil could take place in the magnetic field with sufficient amplitude to create a very large amount of sound, so that the operating circuit to the coil would not be broken. *That was the new result obtained under claim 8 of the first patent.* The decidedly new result obtained by us from the invention as represented in the other patent was the development of a loudspeaker which was commercial in all its forms; it permitted a very great amplitude of movement of the movable coil; it permitted commercial operation and shipment of the instrument; it permitted the instrument to have great acoustical efficiency and mechanical efficiency. In fact, it was a successful instrument from the standpoint of commercial use. The fact

that the pole pieces were held in spaced relation within the casing and a flat plate was used as one of the poles and the sound-box with its diaphragm was mounted on one of those poles to be in steady fixed relation with the concentric air gap gave us an instrument which had not been produced before, and *it produced an entirely new result that had not been produced before.*" (R. 343-344.)

Making a device practical and effective where earlier devices or schemes are proven to have been impractical and ineffective for the purpose intended, is not a "mere carrying forward" such as this Court had under consideration in *Ray v. Bunting*, 4 Fed. (2d) 214, and *Elliott v. Smith*, 50 Fed. (2d) 813, relied upon by defendants. Rather it is a new result such as will support a patent and entitle it to a liberal construction.

In the case of *Keystone Mfg. Co. v. Adams*, 151 U. S. 139, the Court said:

"It must be admitted that both of these patents granted to Augustus Adams, one in 1861, the other in 1866, describe mechanical contrivances closely resembling the invention in question, patented by H. A. Adams, October 15, 1872. There is present in all three machines a rotating shaft with spurs or wings, and the purpose sought to be effected is the same.

But, as we have seen, when the test of practical success is applied, the conclusion is favorable to the last patent.

Where the patented invention consists of an improvement of machines previously existing, it

is not always easy to point out what it is that distinguishes a new and successful machine from an old and ineffectual one. But when, in a class of machines so widely used as those in question, it is made to appear that at last, after repeated and futile attempts, a machine has been contrived which accomplishes the result desired, and when the Patent Office has granted a patent to the successful inventor, the courts should not be ready to adopt a narrow or astute construction, fatal to the grant." (Pages 144-145.)

Again, in the *Barbed Wire Patent*, 143 U. S. 275, the change over the prior art consisted of a slight change in the shape of the barb, from a diamond-shaped prong to a twisted wire having a beveled prong. In sustaining the patent the Court said:

"The difference between the Kelly fence (prior art) and the Glidden fence (patent in suit) is not a radical one, but slight as it may seem to be, it was apparently this which made the barbed-wire fence a *practical and commercial success*."

The Court then goes on to say:

"In the law of patents it is the last step that wins. It may be strange that, considering the important results obtained by Kelly in his patent, it did not occur to him to substitute a coiled wire in place of the diamond shape prong, but evidently it did not; and to the man to whom it did ought not to be denied the quality of inventor. There are many instances in the reported decisions of this court where a monopoly has been sustained in favor of the last of a series of inventors, all of whom were groping to attain

a certain result, which only the last one of the number seemed able to grasp." (Page 283.)

In this case it may seem strange (at least from the defendants' viewpoint) that it did not occur to Lodge in his patent to center the inner and outer poles by means of a spacing ring attached to the under side of the top plate and fitting snugly over the center pole, and to employ as a sound reproducing diaphragm something smaller than the large deal board mounted independently of the magnetizing structure, and to support the diaphragm peripherally in a housing, which housing is directly fixed to the top plate of the magnetizing structure so as to locate and retain the moving coil in its narrow air gap. Had Lodge thought of these changes, he would have been able to make his air gap considerably narrower, and instead of obtaining sounds "not as loud as a person's speech", he would have obtained sounds in such volume as could be heard a distance of several miles.

**PRIOR ART DID NOT TEACH SOLUTION OF THE PROBLEMS
CONFRONTING PRIDHAM AND JENSEN.**

It is clear from the testimony given by Mr. Pridham, that the problems which confronted Pridham and Jensen and which they successfully solved, were difficult of solution, and that the patentees of the prior patents, while probably appreciating that the narrowest possible air gap would increase the efficiency of the device, failed to so design their structures as to permit of the use of an extremely narrow air gap or

a diaphragm so mounted as to insure maintenance of the moving coil in the narrow air gap.

The alignment and centering of the pole pieces in the Lodge British patent is one of haphazardness. The collars *f* shown in Sheet 1 of this patent are merely intended to serve as vertical supports for the plate *c''*, and nothing is said concerning an accurately fitted spacing ring similar to Pridham and Jensen's spacing member 11 of the second patent in suit. Moreover, these collars *f* are shown only in connection with a multi-polar instrument; and in those instances where Lodge concerned himself with a cylindrical form of casing having a single central inner pole piece, nothing in the nature of the collars *f* was used. (See Fig. 7; also Plff's. Exhibit 13.) Merely fastening the outer pole piece upon the cylindrical casing by means of bolts, screws, or like fastening means, would not serve the purpose of accurate spacing, for the reason that these fastening devices can not be accurately gauged and fitted as in the case of the Pridham and Jensen spacing ring. Moreover, such fastening devices are bound to become loosened after a certain amount of use of the instrument, as there is considerable vibration produced throughout the instrument by the operation of the moving coil and diaphragm.

It has also been contended by defendants that the upper end of the spool upon which the magnetizing coil is wound in the Lodge syntonie device functions as a spacing member for the pole pieces; but there is no disclosure of this in the Lodge publications. Moreover, the spool-ends are usually made of non-metallic

material such as paper, fiber, or some composition of more or less yielding character and not accurately gauged to fit tightly within the cylinder. On the contrary, these spool-ends should be of relatively loose fit, in order that the coil may be inserted and removed without difficulty. In actual production very great tolerance would have to be allowed for, so that any one coil out of a large lot could be dropped into any one of a large number of cylinders.

Concerning Lodge's shelf-like support *f* and the spool ends of his syntonie receiver, since they were not intended to or adapted to serve the purpose of plaintiff's spacing means 11, the language of the Supreme Court in *Topliff v. Topliff*, 145 U. S. 156 applies with peculiar force. There it was said:

“While it is possible that the Stringfellow and Surles patent might, by a slight modification, be made to perform the function of equalizing the springs which it was the object of the Augur patent to secure, that was evidently not in the mind of the patentees, and the patent is inoperative for that purpose. Their device evidently approached very near the idea of an equalizer; but the idea did not apparently dawn upon them, nor was there anything in their patent which would have suggested it to a mechanic of ordinary intelligence, unless he were examining it for that purpose. It is not sufficient to constitute an anticipation that the device relied upon might, by modification, be made to accomplish the function performed by the patent in question, if it were not designed by its maker, nor adapted, nor actually used, for the performance of such functions.” (Page 161.)

It is clear that Lodge in his British patent considered it necessary for loud speaking purposes to employ a large sound board—so large that it could not be fitted into a sound box or a housing and the latter be kept within such proportions as would enable it to be fixed to the top plate of the magnetizing structure in a manner that would insure correct disposition and maintenance of the moving coil in the narrow air gap.

Mr. Pridham in explaining these problems testified:

“However, if you do have a narrow air gap you are immediately confronted with a serious problem, because there is a very intense magnetic attraction between the poles of the air gap, especially in an electrodynamic receiver where you have from 10,000 to 20,000 lines per square centimeter, and this attraction is very, very great. The slightest tendency of the poles to get off center will immediately shift that pole over and it will contact with the air gap to close the circuit. In general, the more narrow the air gap the more dangerous the situation becomes as to keeping that air gap in its true form.

Q. With regard to arranging the movable coil in that gap, does that present any problem?

A. That presents a very difficult problem indeed. It is not only necessary to space the two poles apart to form a very narrow concentric air gap, but it is very necessary to so arrange that coil in the air gap that it may vibrate up and down, an axial motion, the vibration of a quarter to half an inch, whereas the distance between the pole faces and the coil may be only .002 or .003 of an inch. That is a very serious problem, and it

is a problem that Magnavox conquered by mounting the diaphragm with its coil on one of the spaced poles, the other being of course spaced from the first one, and the diaphragm with its attendant coil mounted on the first pole; consequently, the coil was rigidly positioned in respect to this concentric air gap.

Q. And in your opinion are those problems which readily could be solved by the ordinary electrician or mechanic?

A. They are by no means easy problems to solve. It took us, you might say, from 1911 to 1920 to solve those problems, with a very urgent desire to solve them and a very urgent need to solve them." (R. 372-3.)

In strong contrast with the struggles which Pridham and Jensen went through to give to the world a practical and efficient loud speaker, is the spectacle presented by one of the defendants (namely, Stromberg-Carlson Company) which for several years purchased and used Magnavox devices of the type marked "Plff's. Exhibit 20", and then, after learning all there was to know about the construction and assembly of the loud speaker, and desiring to appropriate to themselves the profits which Magnavox Company had been making as the manufacturer, proceeded to make a substantial copy of the Magnavox instrument and thereafter to manufacture it in large quantities in violation of the rights of plaintiff. (R. 346.)

Quite appropriately the language of the Court of Appeals, 3rd Circuit, in *Consolidated Window Glass Co. v. Window Glass Mach. Co.*, 261 Fed. 362, may be applied to the present situation:

“Nor should these earlier, but abortive, attempts which resulted in absolutely nothing, shield and protect from infringement and accounting those who copied not the abortive failures, but the successful steps of the originators of machine-drawn glass.” (Page 369.)

As said by this Court in *Pelton Water Wheel Co. v. Doble*, 190 Fed. 760:

“It is urged that the addition of this feature to the combination does not show invention; that it was to do the obvious thing, that which any mechanic would have done when called upon to remedy the known defects of prior devices. To this it is to be said, among other things, that although the defects of the nozzles which had been in use for many years prior to Doble’s invention were well known and recognized, and mechanics and engineers had been called upon to remedy them, no one prior to Doble thought of the simple expedient of changing the axis of the pipe from the horizontal to the perpendicular. *That one step in the art marked success in the combination.*” (Page 763.)

The Court of Appeals, 10th Circuit, in the recent case of *Hughes Tool Co. v. International Supply Co.*, 47 Fed. (2d) 490, cited the *Pelton* case and followed the doctrine thereof. Therein, Judge Cotteral said:

“And where an existing patent is deficient and the prolonged efforts of experts have failed to remedy it, the discovery of the needed improvement, added to its commercial success and the presumption of validity, justifies the conclusion that it is due to invention and not mechanical skill.”

LEGAL SIGNIFICANCE OF WIDESPREAD ADOPTION, AND
SUPPLANTING OF EARLIER DEVICES.

The undisputed evidence is to the effect that Pridham and Jensen started their experiments several years before the Panama-Pacific Exposition of 1915 in San Francisco; that they produced a workable loud speaker which they were able to demonstrate in that year. That speaker had to do with the first patent in suit, but because of its flat-coil construction and its horseshoe magnet, they were not enabled to manufacture, sell, and distribute it to any considerable extent. In 1919 they arrived at the construction of the second patent. This latter was a commercial success from the outset and was really the first dynamic loud speaker that was so constructed that it could be entrusted in the hands of the public with any degree of confidence that it would continue to operate under any and all conditions.

The record shows that Magnavox Company has sold approximately one and one-half millions of the loud speakers covered by the patents in suit, these devices having a value of approximately fourteen million dollars. (R. 345.) These figures do not include loud speakers made and sold by the licensees, on which substantial royalties have been paid to plaintiff. Among such licensees is the gigantic Grigsby-Grunow Company, manufacturers of "Majestic" radios and loud speakers. (R. 346.)

The acclaim and success with which the Magnavox dynamic instrument met is not only shown by the testimony of numerous witnesses familiar with the trade, viz., Linden, Warner, Eiberle, Zemansky, Met-

calf, and Pridham, and the several scientific publications identified by them, but is also written into the records of litigation where Magnavox was not a party nor in any wise a participant. Thus, in the case of *Western Electric Co. v. Kersten Radio Equipment, Inc.*, 44 Fed. (2d) 644, tried in the Western District of Michigan, wherein was involved a newly-issued dynamic loud speaker patent having to do with certain refinements, the Court said in considering the prior art (much the same as presented here):

“None of them, with the exception of Pridham and Jensen, No. 1,448,279, found commercial use.” (Page 645.)

“The record discloses that none of the cited prior art devices is capable of reproducing the necessary range of frequencies nor the overtones to give them other than extremely limited value in any commercial field. *The one exception is the Magnavox of the Pridham and Jensen patent.* * * * *It appears that none of the prior art devices, with the exception of Magnavox, has found any commercial use.*” (Page 646.)

In *Minerals Separation v. Hyde*, 242 U. S. 261, it was said:

“The record shows not only that the process in suit was promptly considered by the patentees as an original and important discovery, but that it was immediately generally accepted as so great an advance over any process known before that, without puffing or other business exploitation, it promptly came into extensive use for the concentration of ores in most, if not all, of the principal mining countries of the world, notably in the

United States, Australia, Sweden, Chile, and Cuba, and that, because of its economy and simplicity, it has largely replaced all earlier processes. This, of itself, is persuasive evidence of that invention which it is the purpose of the patent laws to reward and protect. *Diamond Rubber Co. v. Consolidated Rubber Tire Co.*, 220 U. S. 428, 55 L. ed. 527, 31 Sup. Ct. Rep. 444; *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U. S. 403, 429, 430, 46 L. ed. 968, 983, 22 Sup. Ct. Rep. 698; *Barbed Wire Patent (Washburn & M. Mfg. Co. v. Beat Em All Barbed Wire Co.)*, 143 U. S. 275, 36 L. ed. 154, 12 Sup. Ct. Rep. 443, 450; *Smith v. Goodyear Dental Vulcanite Co.*, 93 U. S. 486, 23 L. ed. 952.”

To the same effect is the ruling of this Court in *Sherman-Clay & Co. v. Searchlight Horn Co.*, 214 Fed. 86, where it was held that it is proper to charge a jury that the fact that a device has gone into general use and has supplanted other devices used for a similar purpose, is sufficient evidence of invention, in the absence of evidence to show that the success was due to any other cause than that of the merits of the device.

In *Hartford-Empire Co. v. Hazel-Atlas Glass Co.*, 59 Fed. (2d) 399 (C. C. A. 3rd Circuit), it was said:

“And where an art, eager for relief, found in these moribund patents nothing to meet that suggested solution, it is safer to rely evidentially on the then judgment, attitude, and conduct of the glass trade rather than on the post litem testimony of experts, the contentions of infringers, and the theoretical construction that often tempts

courts to create out of lifeless patents an imaginary machine on paper which a working art could not do in steel." (Page 413.)

Likewise, applicable to the facts herein, is the principle enunciated by the Second Circuit Court of Appeals in *General Electric Co. v. U. S. Electric Mfg. Co.*, 63 Fed. (2d) 764, as follows:

"In the 'plaster ear' patent we find a practical and commercially successful, solution of a long-felt difficulty which many others had sought to obviate. Such striving and failure followed by ultimate success on the part of the patentee is the strongest proof of invention." (Page 767.)

CONCLUSION.

Practically every test laid down by the Courts for determining the presence of invention of a meritorious character applies to the patents in suit. The evidence supporting the same is not in dispute. There is no gainsaying the fact that the closest prior patents fall far short of giving the information necessary to produce a loud speaker having the characteristics and advantages of the Magnavox Speaker, as shown and described in the second patent in suit. These may be conveniently summed up as follows:

- (1) A successful unitary dynamic type loud speaker bringing to the home for the first time:
- (2) Loud reproduction of music and speech.
- (3) Acoustical accuracy over the full range of audible frequencies (due to peripheral support for the diaphragm).

(4) No rattling of the voice coil against the pole pieces (due to spacing means and to affixing the diaphragm and its housing upon the top plate).

(5) A large amplitude of movement of the voice coil so that all frequencies were reproduced.

(6) An even strength of magnetic field (due to spacing means).

(7) A single unit, completed assembly, compact and foolproof (due to affixing the diaphragm and its housing upon the top plate).

(8) No possibility of vital parts getting out of adjustment.

(9) Assembly in the factory or by dealers without use of jigs or special tools.

(10) Economy in amount of copper wire for coil of magnet (due to narrow air gap).

(11) Economy in current requirements for the field coil, due to compactness and proper positioning of parts.

There is no denial that these features are present in defendants' devices. While they may not be set forth in the patent description in the manner above mentioned, they are inherent in the structure illustrated, described and claimed, and it is well settled that an inventor is entitled to all that his patent fairly covers, even though its complete capacity is not recited in the specifications and may have been unknown to the inventor prior to the time it issued. (*Diamond*

Rubber Co. v. Consolidated Rubber Tire Co., 220 U. S. 428.)

Considering the merit of the Pridham and Jensen inventions, the law invests the patents with such a range of equivalents that any finding of non-infringement by the structures herein complained of is plain error, and the decree of dismissal should be reversed.

Dated, San Francisco,
March 1, 1934.

Respectfully submitted,

CHARLES E. TOWNSEND,

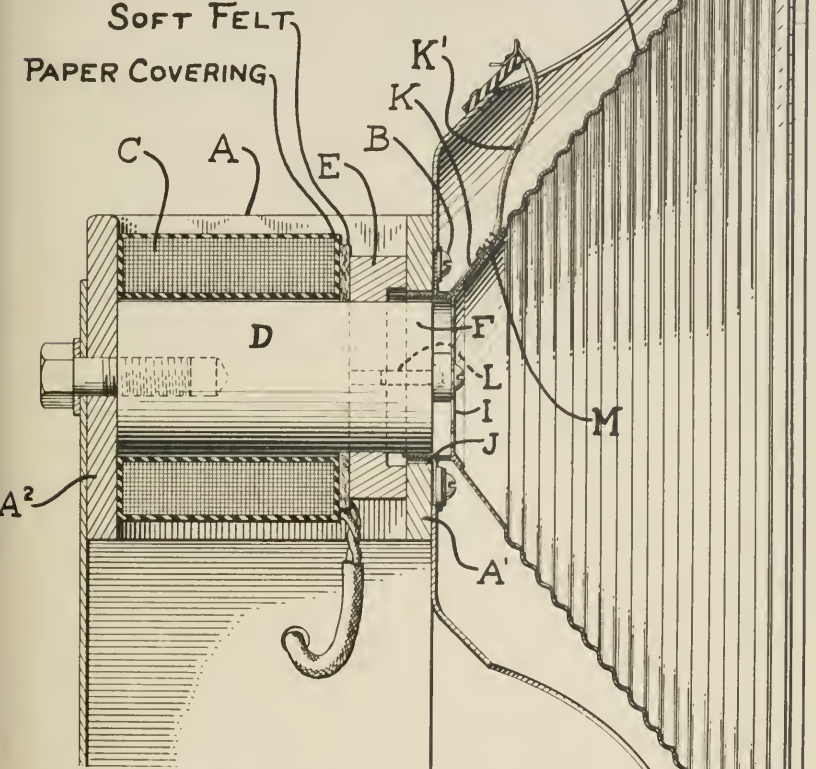
WILLIAM A. LOFTUS,

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CROSS-SECTION OF STROMBERG-CARLSON LOUD SPEAKER
COMPARED WITH CLAIMS OF THE TWO PATENTS IN SUIT:

Claim 8, Patent No. 1,266,988:

- In a receiver for telephony, the combination with
1. a sound box and its diaphragm (H and G),
 2. of a magnetic field (gap between pole pieces A' and F),
 3. a vibrating conducting coil (J) for the telephonic currents disposed in said field and rigidly secured to the diaphragm;
 4. and connections (K) between said coil and the operating circuit (K') comprising thin metallic strips secured to the diaphragm.



Claim 8, Patent No. 1,448,279:

- An electro-dynamic receiver comprising:
1. a shell or casing (A) having bottom and side walls formed of magnetizable material,
 2. a magnetizing coil (C) within said casing,
 3. a core (D) for the coil extending from the bottom of the casing to the top thereof and formed at its upper end with an inner pole piece (F),
 4. an outer pole piece (A') in the form of a flat plate arranged upon the casing and having a central opening surrounding the

